FIG. 1

Tobamovirus Expression Vectors

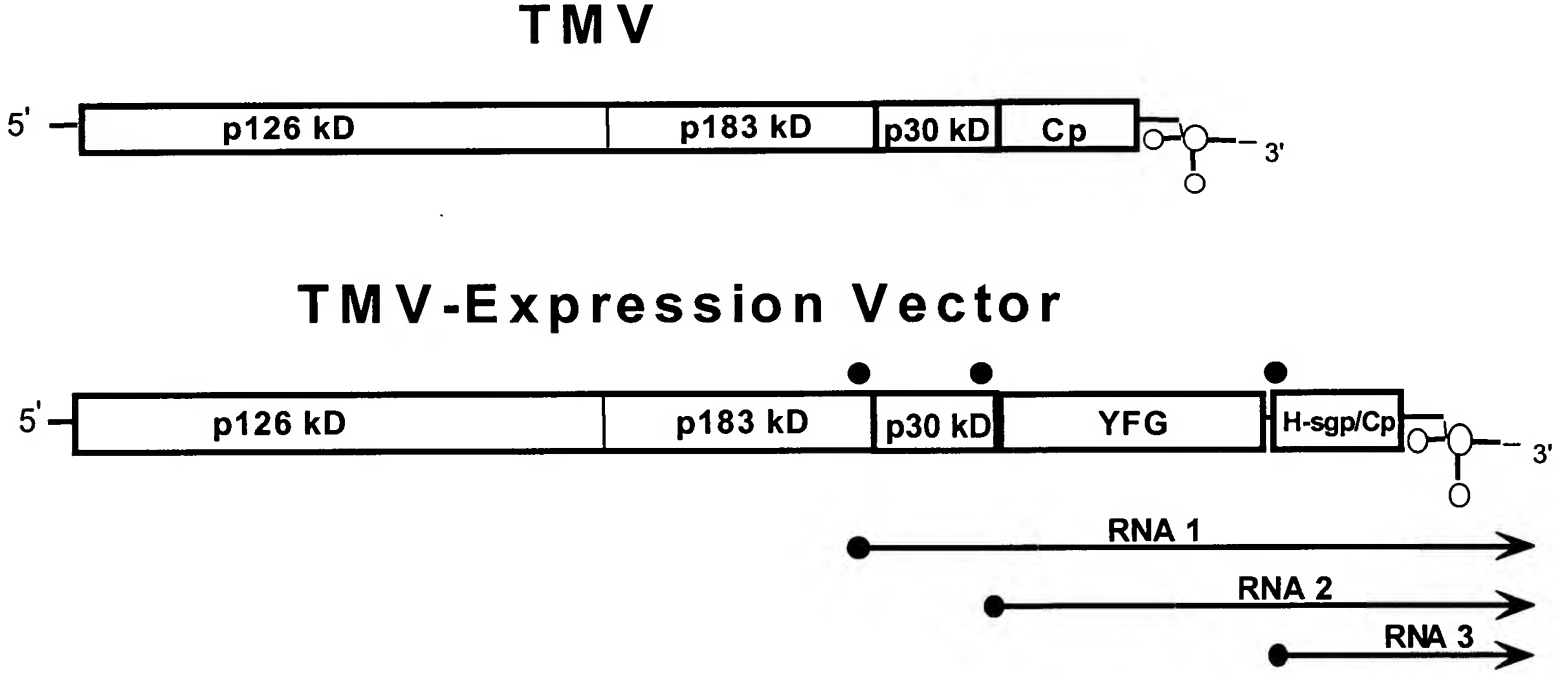


FIG. 2

Tobamovirus Vector for rGal-A Expression

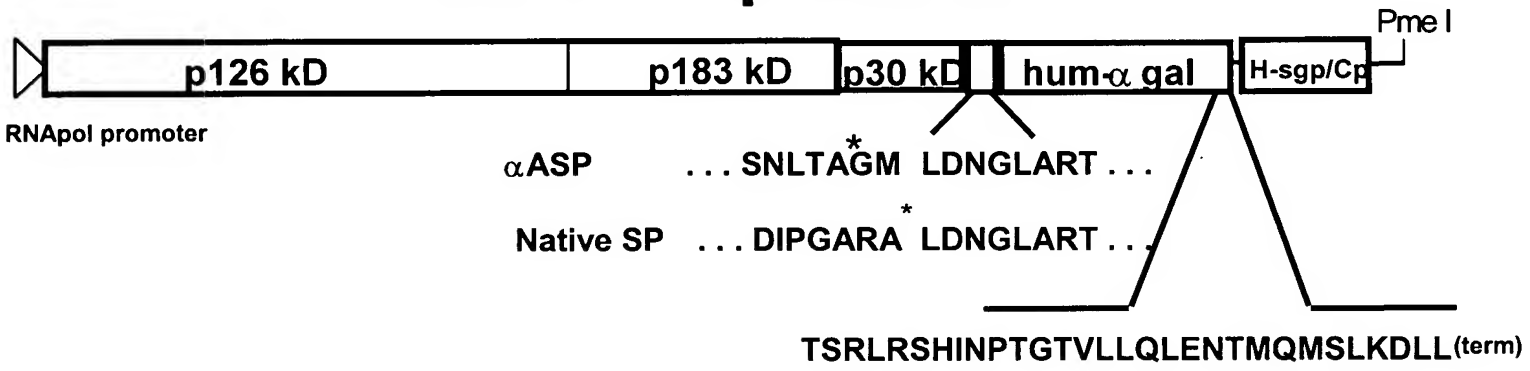


FIG. 3

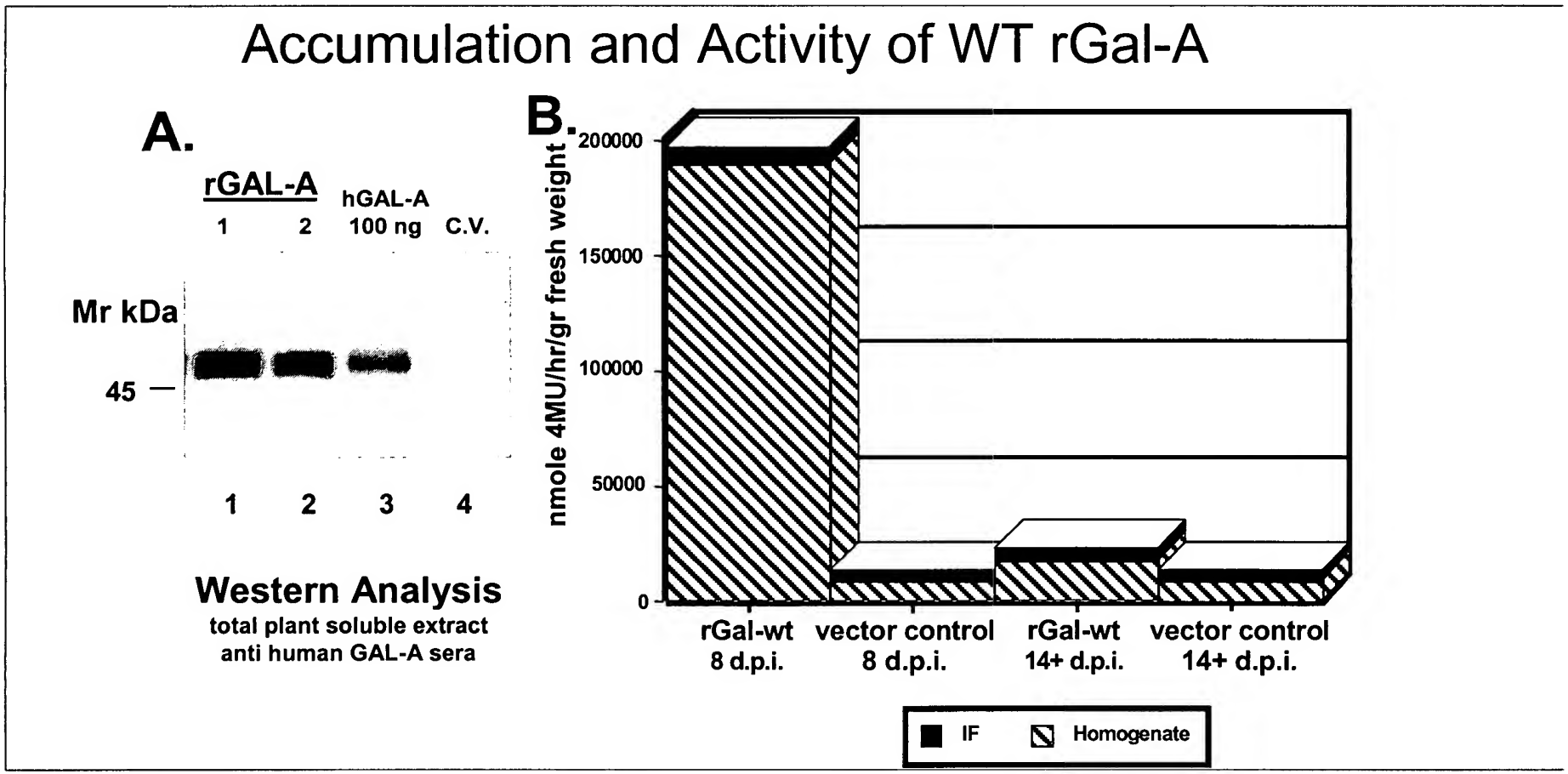

Accumulation and Activity of WT rGal-A
A.
rGAL-A
hGAL-A
1
2
100 ng
C.V.
Mr kDa
45
1
2
3
4
Western Analysis
total plant soluble extract
anti human GAL-A sera
B.
nmole 4MU/hr/gr fresh weight
200000
150000
100000
50000
0
rGal-wt 8 d.p.i.
vector control 8 d.p.i.
rGal-wt 14+ d.p.i.
vector control 14+ d.p.i.
IF
Homogenate

FIG. 4

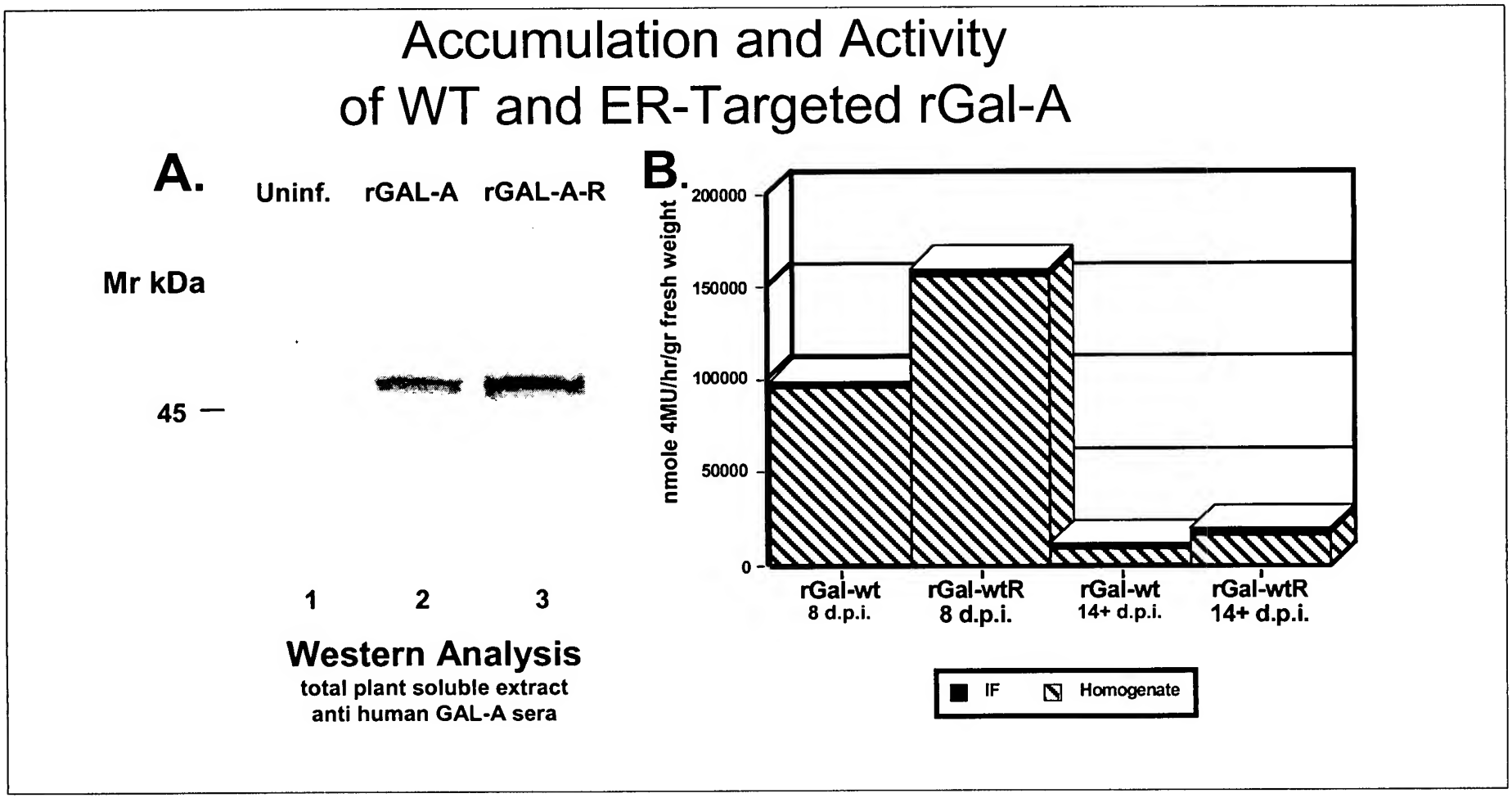
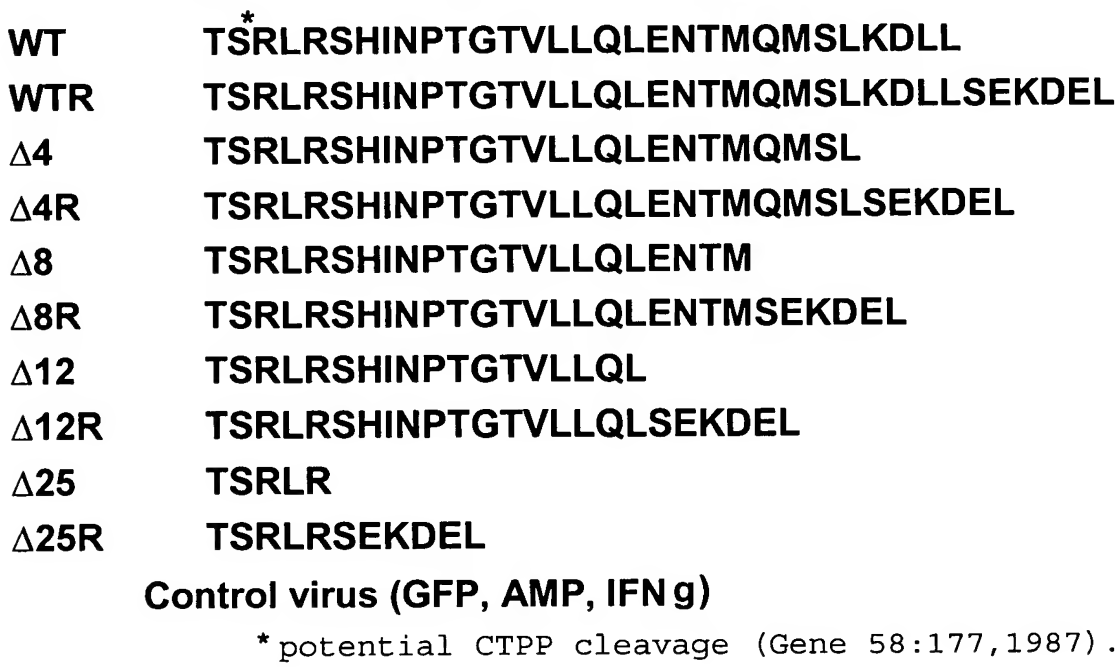

Accumulation and Activity
of WT and ER-Targeted rGal-A
A.
Uninf.
rGAL-A
rGAL-A-R
Mr kDa
45
1
2
3
Western Analysis
total plant soluble extract
anti human GAL-A sera
B.
nmole 4MU/hr/gr fresh weight
200000
150000
100000
50000
0
rGal-wt
8 d.p.i.
rGal-wtR
8 d.p.i.
rGal-wt
14+ d.p.i.
rGal-wtR
14+ d.p.i.
IF
Homogenate

FIG. 5

Carboxy-Modifications to rGal-A



*potential CTPP cleavage (Gene 58:177,1987).

Fig. 6
Western Blot Analysis of Carboxy-modified rGal-A

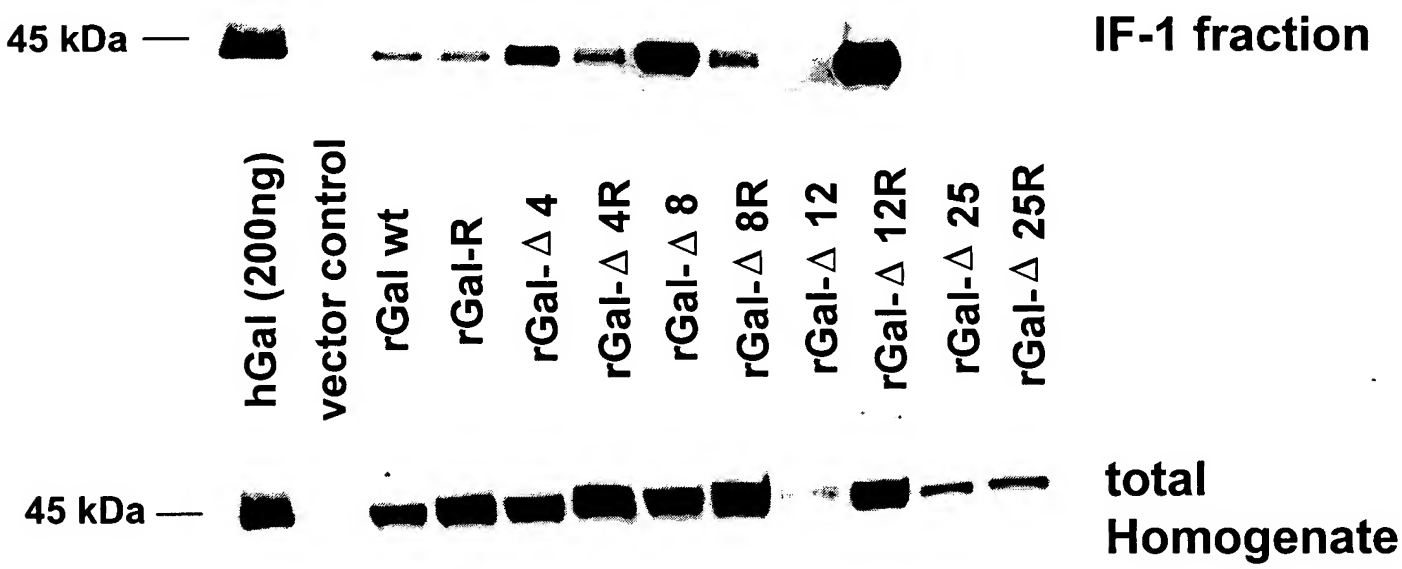
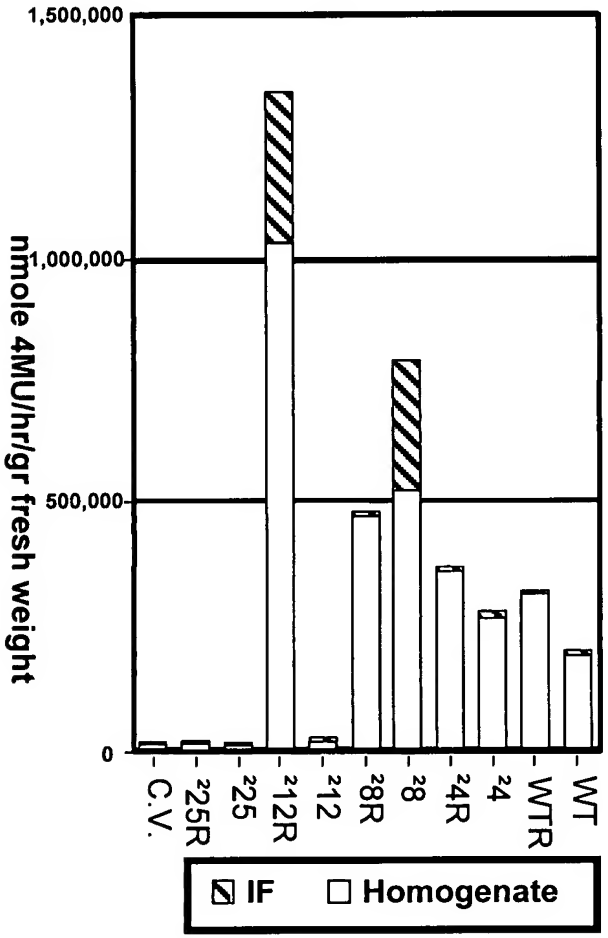


FIG. 7

Enzymatic Activity of Carboxy-Modified rGal-A



	-30 -20 -10
	*
WT	TSRLRSHINPTGTVLLQLENTMQMSLKDLL
WTR	TSRLRSHINPTGTVLLQLENTMQMSLKDLLSEKDEL
²4	TSRLRSHINPTGTVLLQLENTMQMSL
²4R	TSRLRSHINPTGTVLLQLENTMQMSLSEKDEL
²8	TSRLRSHINPTGTVLLQLENTM
²8R	TSRLRSHINPTGTVLLQLENTMSEKDEL
²12	TSRLRSHINPTGTVLLQL
²12R	TSRLRSHINPTGTVLLQLSEKDEL
²25	TSRLR
²25R	TSRLRSEKDEL
Control virus (GFP, AMP, IFNg)	

* potential CTPP cleavage (Gene 58:177,1987).

FIG. 8

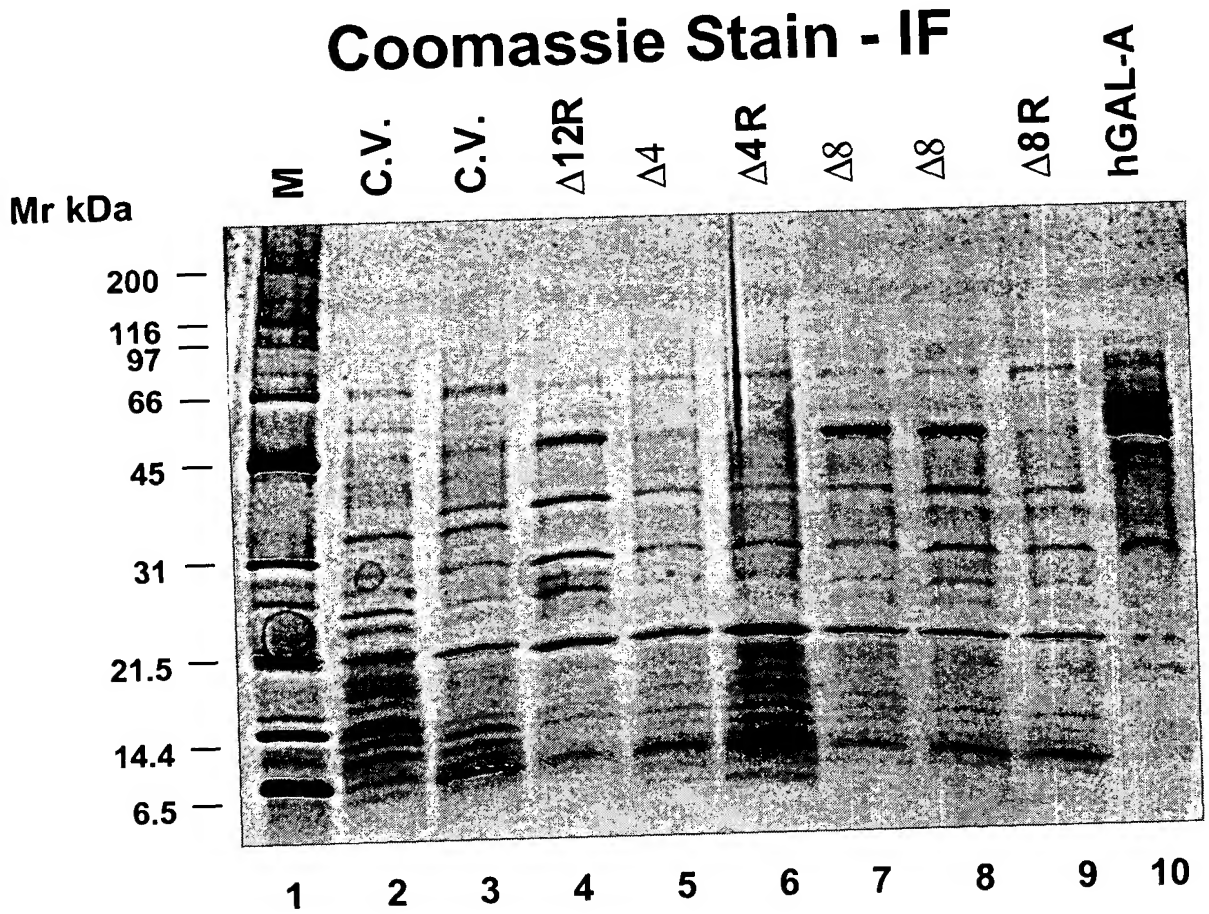


FIG. 9

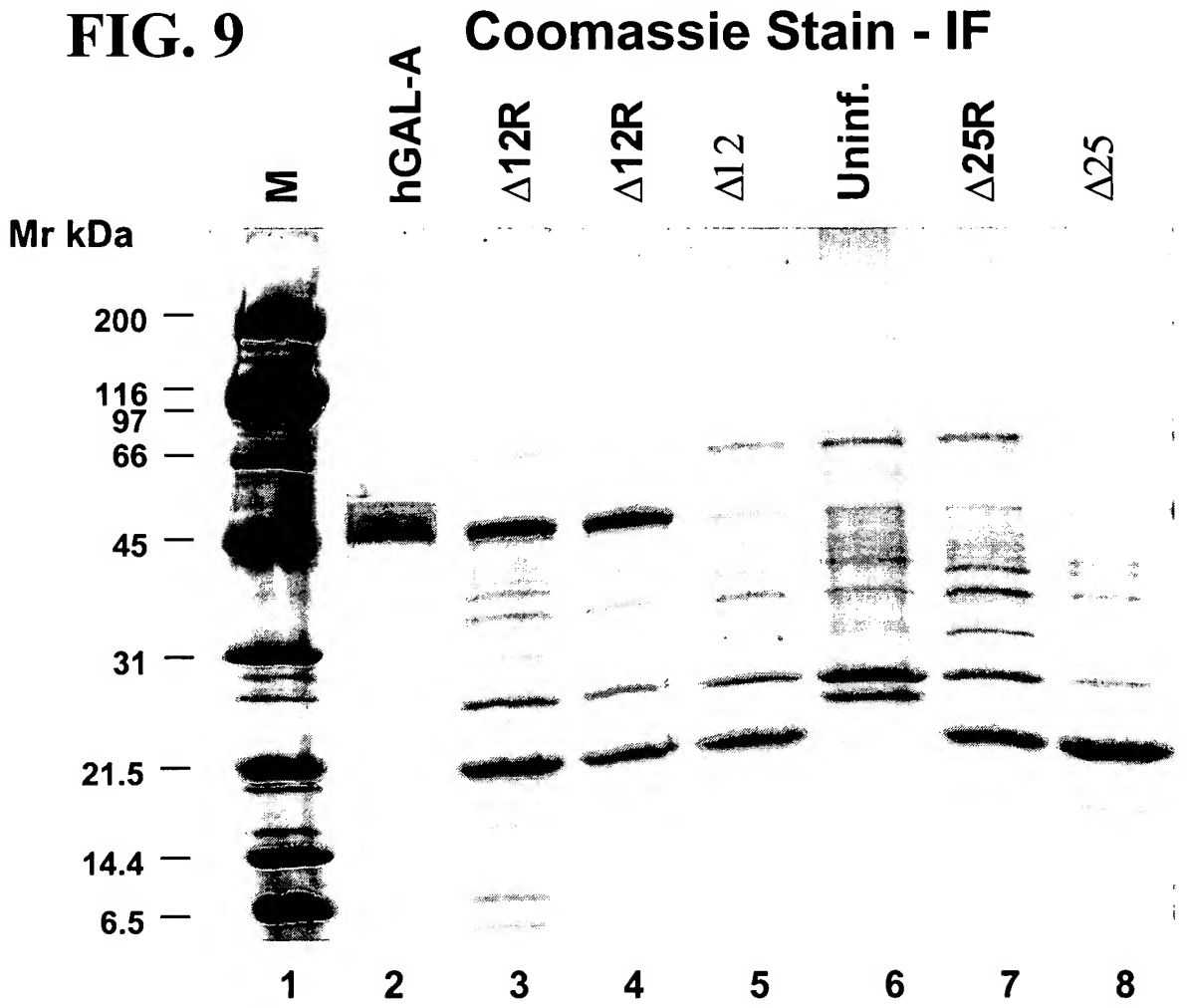


FIG. 10

Schematic of rGal-A Secretion

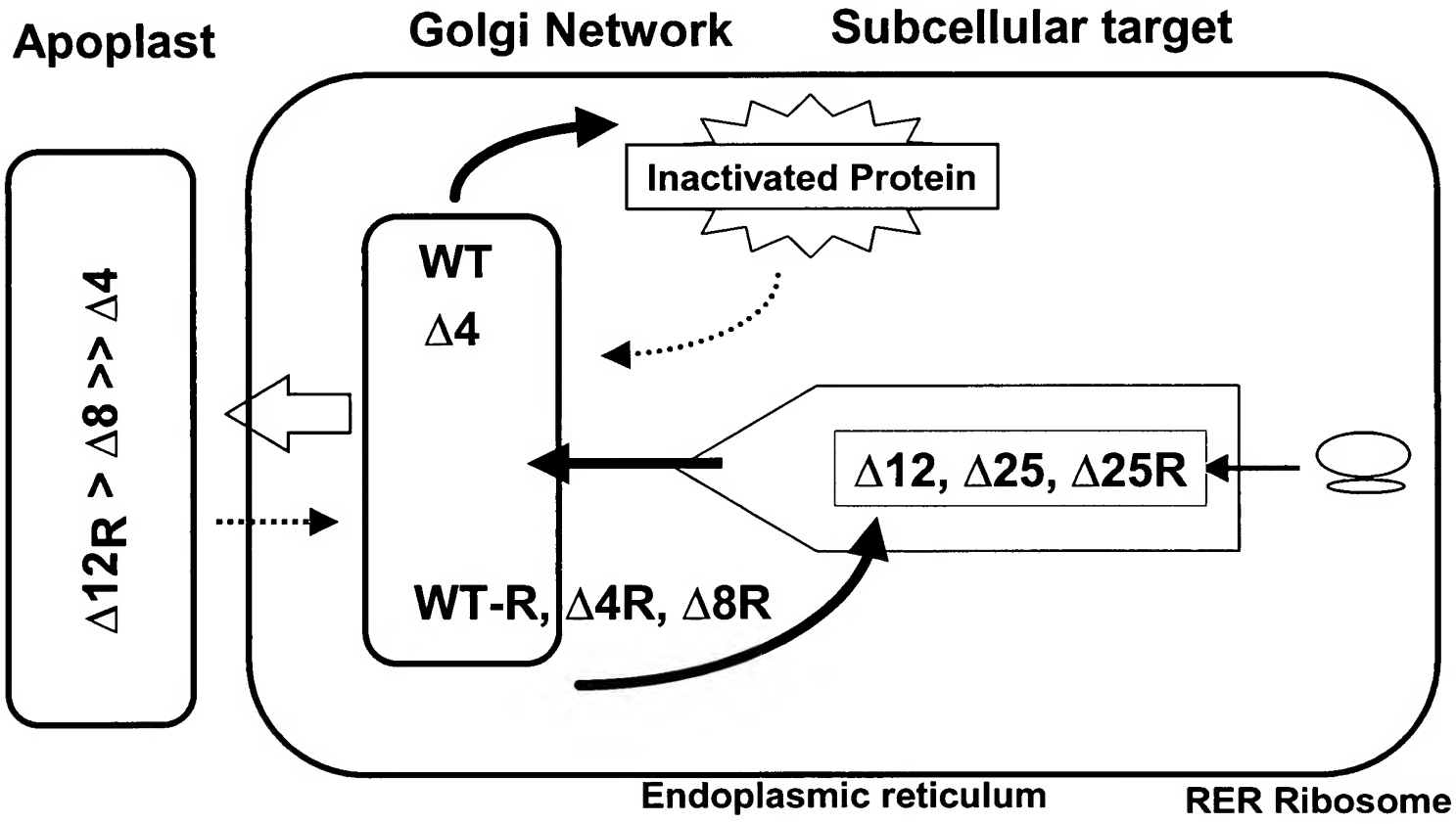


FIG. 11

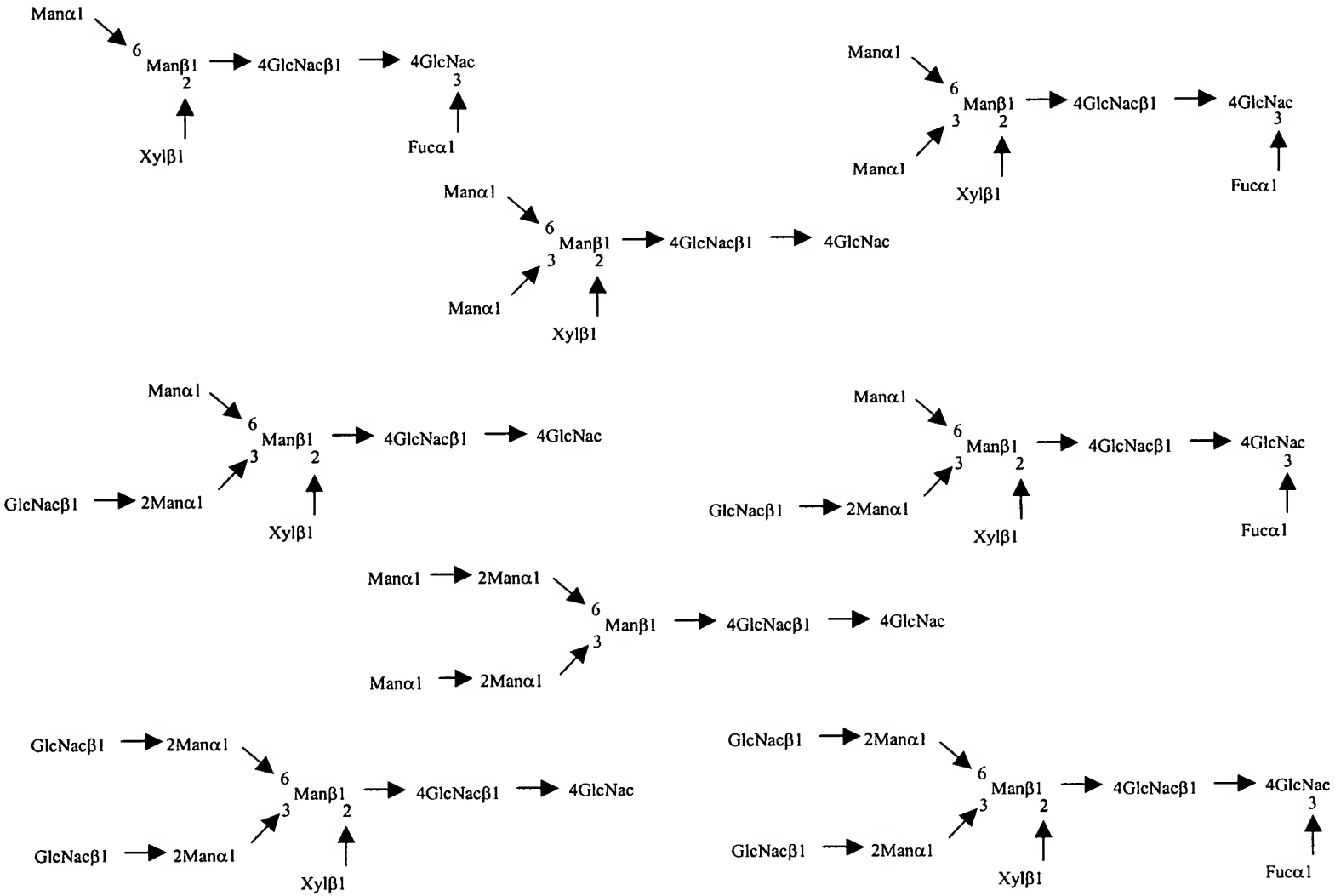
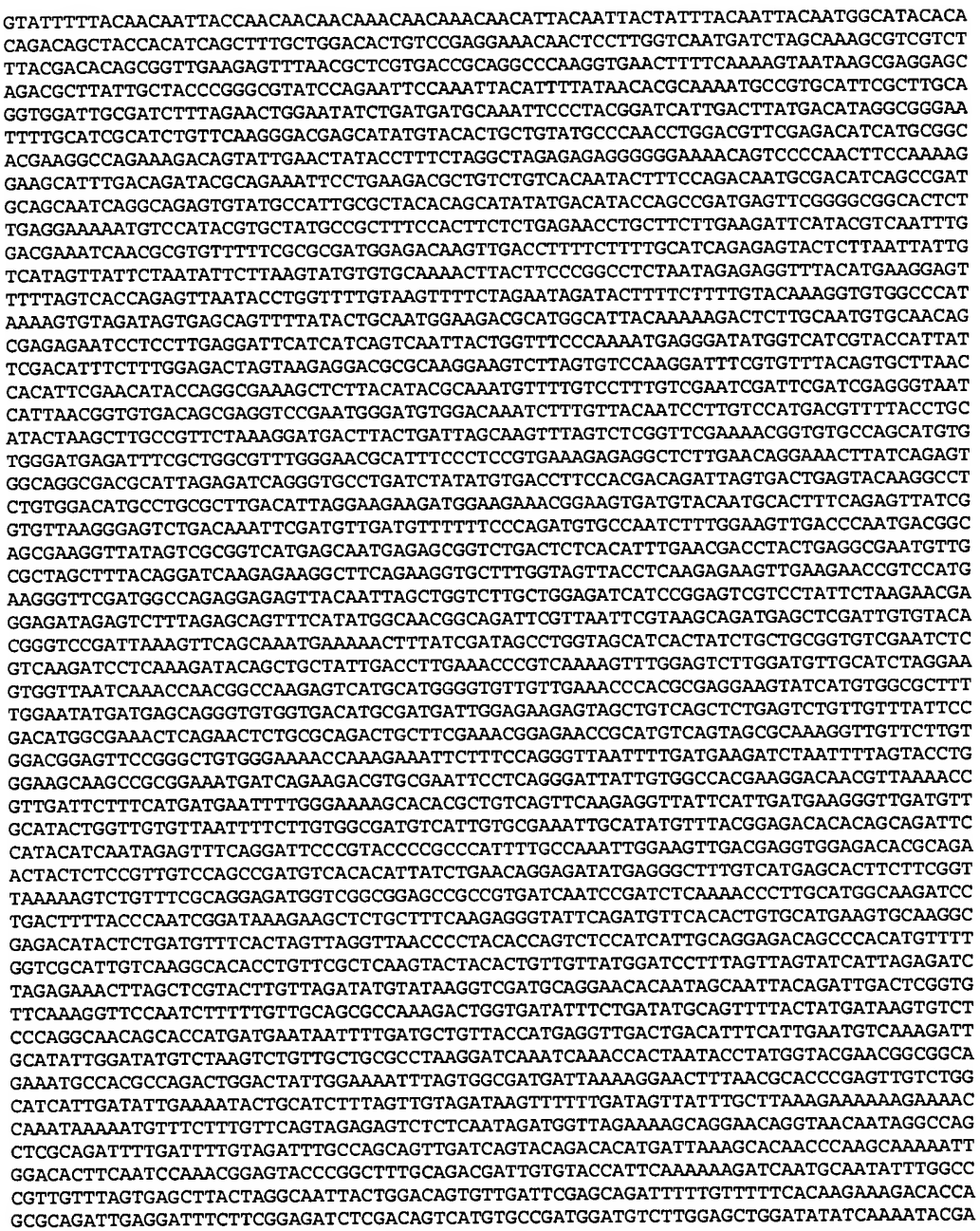

Manα1
6
Manβ1
2
4GlcNacβ1
4GlcNac
3
Xylβ1
Fucα1
Manα1
6
Manβ1
3
2
4GlcNacβ1
4GlcNac
Manα1
Xylβ1
3
Fucα1
Manα1
6
Manβ1
3
2
4GlcNacβ1
4GlcNac
Manα1
Xylβ1
Manα1
6
Manβ1
3
2
4GlcNacβ1
4GlcNac
GlcNacβ1
2Manα1
Xylβ1
Manα1
6
Manβ1
3
2
4GlcNacβ1
4GlcNac
GlcNacβ1
2Manα1
Xylβ1
3
Fucα1
Manα1
2Manα1
6
Manβ1
3
4GlcNacβ1
4GlcNac
Manα1
2Manα1
GlcNacβ1
2Manα1
6
Manβ1
3
2
4GlcNacβ1
4GlcNac
GlcNacβ1
2Manα1
Xylβ1
GlcNacβ1
2Manα1
6
Manβ1
3
2
4GlcNacβ1
4GlcNac
GlcNacβ1
2Manα1
Xylβ1
3
Fucα1

FIG. 12-1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AGACGCTTATTGCTACCCGGGCGTATCCAGAATTCCAAATTACATTTTATAACACGCAAAATGCCGTGCATTCGCTTGCA
GGTGGATTGCGATCTTTAGAACTGGAATATCTGATGATGCAAATTCCCTACGGATCATTGACTTATGACATAGGCGGGAA
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GCAGCAATCAGGCAGAGTGTATGCCATTGCGCTACACAGCATATATGACATACCAGCCGATGAGTTCGGGGCGGCACTCT
TGAGGAAAAATGTCCATACGTGCTATGCCGCTTTCCACTTCTCTGAGAACCTGCTTCTTGAAGATTCATACGTCAATTTG
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TCGACATTTCTTTGGAGACTAGTAAGAGGACGCGCAAGGAAGTCTTAGTGTCCAAGGATTTCGTGTTTACAGTGCTTAAC
CACATTCGAACATACCAGGCGAAAGCTCTTACATACGCAAATGTTTTGTCCTTTGTCGAATCGATTCGATCGAGGGTAAT
CATTAACGGTGTGACAGCGAGGTCCGAATGGGATGTGGACAAATCTTTGTTACAATCCTTGTCCATGACGTTTTACCTGC
ATACTAAGCTTGCCGTTCTAAAGGATGACTTACTGATTAGCAAGTTTAGTCTCGGTTCGAAAACGGTGTGCCAGCATGTG
TGGGATGAGATTTCGCTGGCGTTTGGGAACGCATTTCCCTCCGTGAAAGAGAGGCTCTTGAACAGGAAACTTATCAGAGT
GGCAGGCGACGCATTAGAGATCAGGGTGCCTGATCTATATGTGACCTTCCACGACAGATTAGTGACTGAGTACAAGGCCT
CTGTGGACATGCCTGCGCTTGACATTAGGAAGAAGATGGAAGAAACGGAAGTGATGTACAATGCACTTTCAGAGTTATCG
GTGTTAAGGGAGTCTGACAAATTCGATGTTGATGTTTTTTCCCAGATGTGCCAATCTTTGGAAGTTGACCCAATGACGGC
AGCGAAGGTTATAGTCGCGGTCATGAGCAATGAGAGCGGTCTGACTCTCACATTTGAACGACCTACTGAGGCGAATGTTG
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GTCAAGATCCTCAAAGATACAGCTGCTATTGACCTTGAAACCCGTCAAAAGTTTGGAGTCTTGGATGTTGCATCTAGGAA
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GCATACTGGTTGTGTTAATTTTCTTGTGGCGATGTCATTGTGCGAAATTGCATATGTTTACGGAGACACACAGCAGATTC
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TGACTTTTACCCAATCGGATAAAGAAGCTCTGCTTTCAAGAGGGTATTCAGATGTTCACACTGTGCATGAAGTGCAAGGC
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CCCAGGCAACAGCACCATGATGAATAATTTTGATGCTGTTACCATGAGGTTGACTGACATTTCATTGAATGTCAAAGATT
GCATATTGGATATGTCTAAGTCTGTTGCTGCGCCTAAGGATCAAATCAAACCACTAATACCTATGGTACGAACGGCGGCA
GAAATGCCACGCCAGACTGGACTATTGGAAAATTTAGTGGCGATGATTAAAAGGAACTTTAACGCACCCGAGTTGTCTGG
CATCATTGATATTGAAAATACTGCATCTTTAGTTGTAGATAAGTTTTTTGATAGTTATTTGCTTAAAGAAAAAAGAAAAC
CAAATAAAAATGTTTCTTTGTTCAGTAGAGAGTCTCTCAATAGATGGTTAGAAAAGCAGGAACAGGTAACAATAGGCCAG
CTCGCAGATTTTGATTTTGTAGATTTGCCAGCAGTTGATCAGTACAGACACATGATTAAAGCACAACCCAAGCAAAAATT
GGACACTTCAATCCAAACGGAGTACCCGGCTTTGCAGACGATTGTGTACCATTCAAAAAAGATCAATGCAATATTTGGCC
CGTTGTTTAGTGAGCTTACTAGGCAATTACTGGACAGTGTTGATTCGAGCAGATTTTTGTTTTTCACAAGAAAGACACCA
GCGCAGATTGAGGATTTCTTCGGAGATCTCGACAGTCATGTGCCGATGGATGTCTTGGAGCTGGATATATCAAAATACGA

FIG. 12-2

CAAATCTCAGAATGAATTCCACTGTGCAGTAGAATACGAGATCTGGCGAAGATTGGGTTTTGAAGACTTCTTGGGAGAAG
TTTGGAAACAAGGGCATAGAAAGACCACCCTCAAGGATTATACCGCAGGTATAAAAACTTGCATCTGGTATCAAAGAAAG
AGCGGGGACGTCACGACGTTCATTGGAAACACTGTGATCATTGCTGCATGTTTGGCCTCGATGCTTCCGATGGAGAAAAT
AATCAAAGGAGCCTTTTGCGGTGACGATAGTCTGCTGTACTTTCCAAAGGGTTGTGAGTTTCCGGATGTGCAACACTCCG
CGAATCTTATGTGGAATTTTGAAGCAAAACTGTTTAAAAAACAGTATGGATACTTTTGCGGAAGATATGTAATACATCAC
GACAGAGGATGCATTGTGTATTACGATCCCCTAAAGTTGATCTCGAAACTTGGTGCTAAACACATCAAGGATTGGGAACA
CTTGGAGGAGTTCAGAAGGTCTCTTTGTGATGTTGCTGTTTCGTTGAACAATTGTGCGTATTACACACAGTTGGACGACG
CTGTATGGGAGGTTCATAAGACCGCCCCTCCAGGTTCGTTTGTTTATAAAAGTCTGGTGAAGTATTTGTCTGATAAAGTT
CTTTTTAGAAGTTTGTTTATAGATGGCTCTAGTTGTTAAAGGAAAAGTGAATATCAATGAGTTTATCGACCTGACAAAAA
TGGAGAAGATCTTACCGTCGATGTTTACCCCTGTAAAGAGTGTTATGTGTTCCAAAGTTGATAAAATAATGGTTCATGAG
AATGAGTCATTGTCAGAGGTGAACCTTCTTAAAGGAGTTAAGCTTATTGATAGTGGATACGTCTGTTTAGCCGGTTTGGT
CGTCACGGGCGAGTGGAACTTGCCTGACAATTGCAGAGGAGGTGTGAGCGTGTGTCTGGTGGACAAAAGGATGGAAAGAG
CCGACGAGGCCACTCTCGGATCTTACTACACAGCAGCTGCAAAGAAAAGATTTCAGTTCAAGGTCGTTCCCAATTATGCT
ATAACCACCCAGGACGCGATGAAAAACGTCTGGCAAGTTTTAGTTAATATTAGAAATGTGAAGATGTCAGCGGGTTTCTG
TCCGCTTTCTCTGGAGTTTGTGTCGGTGTGTATTGTTTATAGAAATAATATAAAATTAGGTTTGAGAGAGAAGATTACAA
ACGTGAGAGACGGAGGGCCCATGGAACTTACAGAAGAAGTCGTTGATGAGTTCATGGAAGATGTCCCTATGTCGATCAGG
CTTGCAAAGTTTCGATCTCGAACCGGAAAAAAGAGTGATGTCCGCAAAGGGAAAAATAGTAGTAATGATCGGTCAGTGCC
GAACAAGAACTATAGAAATGTTAAGGATTTTGGAGGAATGAGTTTTAAAAAGAATAATTTAATCGATGATGATTCGGAGG
CTACTGTCGCCGAATCGGATTCGTTTTAAATAGATCTTACAGTATCACTACTCCATCTCAGTTCGTGTTCTTGTCATTAA
TATGCAGGTGCTGAACACCATGGTGAACAAACACTTCTTGTCCCTTTCGGTCCTCATCGTCCTCCTTGGCCTCTCCTCCA
ACTTGACAGCCGGCATGCTGGACAATGGATTGGCAAGGACGCCTACCATGGGCTGGCTGCACTGGGAGCGCTTCATGTGC
AACCTTGACTGCCAGGAAGAGCCAGATTCCTGCATCAGTGAGAAGCTCTTCATGGAGATGGCAGAGCTCATGGTCTCAGA
AGGCTGGAAGGATGCAGGTTATGAGTACCTCTGCATTGATGACTGTTGGATGGCTCCCCAAAGAGATTCAGAAGGCAGAC
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ATTTATGCAGATGTTGGAAATAAAACCTGCGCAGGCTTCCCTGGGAGTTTTGGATACTACGACATTGATGCCCAGACCTT
TGCTGACTGGGGAGTAGATCTGCTAAAATTTGATGGTTGTTACTGTGACAGTTTGGAAAATTTGGCAGATGGTTATAAGC
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AAGCCCAATTATACAGAAATCCGACAGTACTGCAATCACTGGCGAAATTTTGCTGACATTGATGATTCCTGGAAAAGTAT
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CCTTTATTCATGTCTAATGACCTCCGACACATCAGCCCTCAAGCCAAAGCTCTCCTTCAGGATAAGGACGTAATTGCCAT
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AATGCAGTTTTAGATCCTCTAATTACTGCGTTGCTGGGGGCTTTTGATACTAGGAATAGAATAATCGAAGTAGAAAACCA
GCAGAGTCCGACAACAGCTGAAACGTTAGATGCTACCCGCAGGGTAGACGACGCTACGGTTGCAATTCGGTCTGCTATAA
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ACGTACAGTGTTTTTCCCTCCACTTAAATCGAAGGGTAGTGTCTTGGAGCGCGCGGAGTAAACATATATGGTTCATATAT
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CCCTGATAAATGCTTCAATAATATTGAAAAAGGAAGAGTATGAGTATTCAACATTTCCGTGTCGCCCTTATTCCCTTTTT
TGCGGCATTTTGCCTTCCTGTTTTTGCTCACCCAGAAACGCTGGTGAAAGTAAAAGATGCTGAAGATCAGTTGGGTGCAC
GAGTGGGTTACATCGAACTGGATCTCAACAGCGGTAAGATCCTTGAGAGTTTTCGCCCCGAAGAACGTTTTCCAATGATG
AGCACTTTTAAAGTTCTGCTATGTGGCGCGGTATTATCCCGTGTTGACGCCGGGCAAGAGCAACTCGGTCGCCGCATACA
CTATTCTCAGAATGACTTGGTTGAGTACTCACCAGTCACAGAAAAGCATCTTACGGATGGCATGACAGTAAGAGAATTAT

FIG. 12-3

GCAGTGCTGCCATAACCATGAGTGATAACACTGCGGCCAACTTACTTCTGACAACGATCGGAGGACCGAAGGAGCTAACC
GCTTTTTTGCACAACATGGGGGATCATGTAACTCGCCTTGATCGTTGGGAACCGGAGCTGAATGAAGCCATACCAAACGA
CGAGCGTGACACCACGATGCCTGCAGCAATGGCAACAACGTTGCGCAAACTATTAACTGGCGAACTACTTACTCTAGCTT
CCCGGCAACAATTAATAGACTGGATGGAGGCGGATAAAGTTGCAGGACCACTTCTGCGCTCGGCCCTTCCGGCTGGCTGG
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GACGCGATGGATATGTTCTGCCAAGGGTTGGTTTGCGCATTCACAGTTCTCCGCAAGAATTGATTGGCTCCAATTCTTGG
AGTGGTGAATCCGTTAGCGAGGTGCCGCCGGCTTCCATTCAGGTCGAGGTGGCCCGGCTCCATGCACCGCGACGCAACGC
GGGGAGGCAGACAAGGTATAGGGCGGCGCCTACAATCCATGCCAACCCGTTCCATGTGCTCGCCGAGGCGGCATAAATCG
CCGTGACGATCAGCGGTCCAGTGATCGAAGTTAGGCTGGTAAGAGCCGCGAGCGATCCTTGAAGCTGTCCCTGATGGTCG
TCATCTACCTGCCTGGACAGCATGGCCTGCAACGCGGGCATCCCGATGCCGCCGGAAGCGAGAAGAATCATAATGGGGAA
GGCCATCCAGCCTCGCGTCGCGAACGCCAGCAAGACGTAGCCCAGCGCGTCGGCCGCCATGCCGGCGATAATGGCCTGCT
TCTCGCCGAAACGTTTGGTGGCGGGACCAGTGACGAAGGCTTGAGCGAGGGCGTGCAAGATTCCGAATACCGCAAGCGAC
AGGCCGATCATCGTCGCGCTCCAGCGAAAGCGGTCCTCGCCGAAAATGACCCAGAGCGCTGCCGGCACCTGTCCTACGAG
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FIG. 13-1

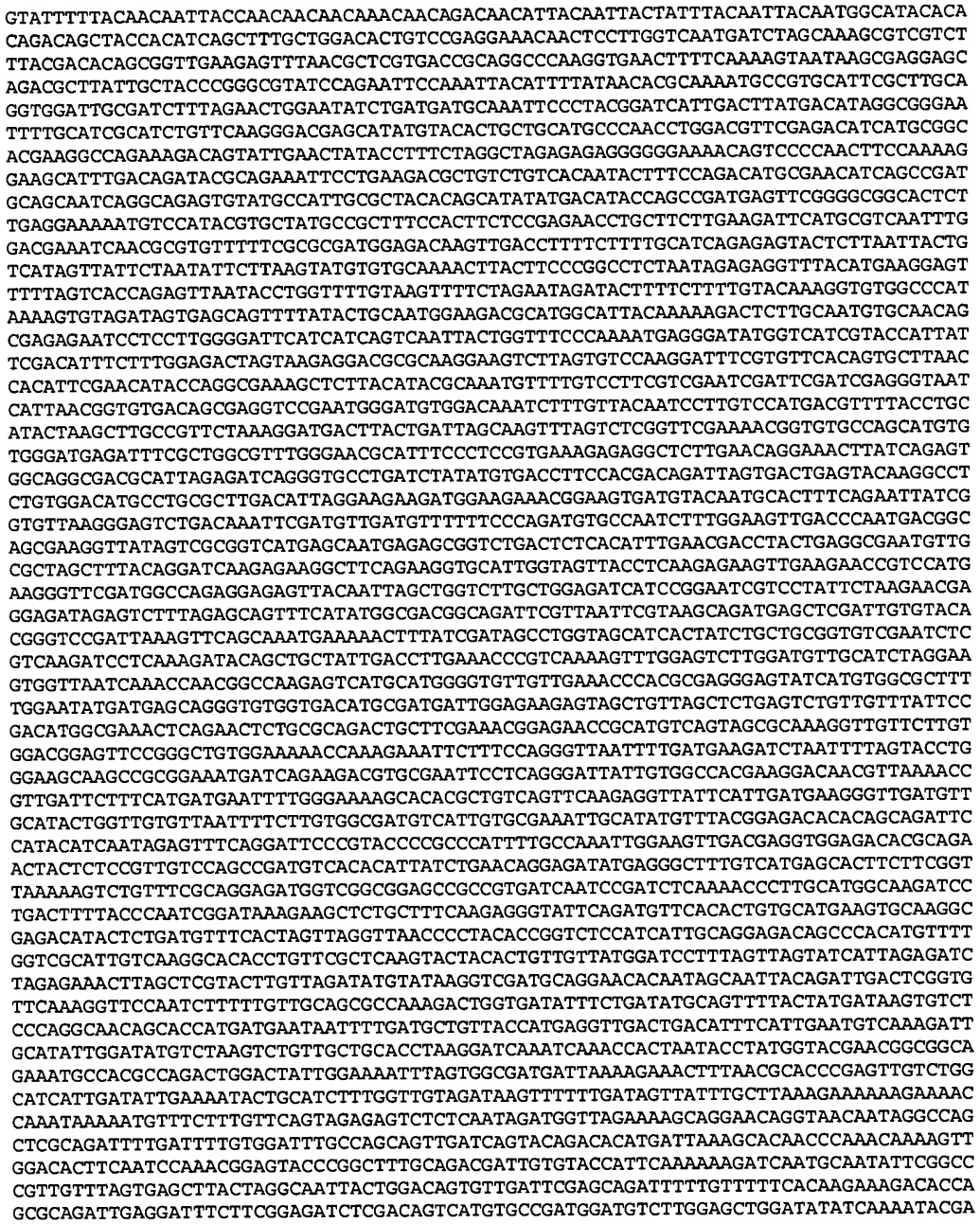
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FIG. 13-2

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TRANSGENIC VECTOR FOR rGCB EXPRESSION

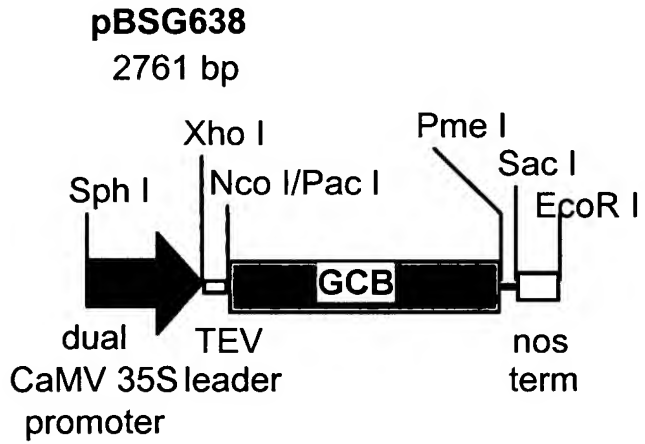

FIG. 14

VIRAL VECTOR FOR rGCB EXPRESSION

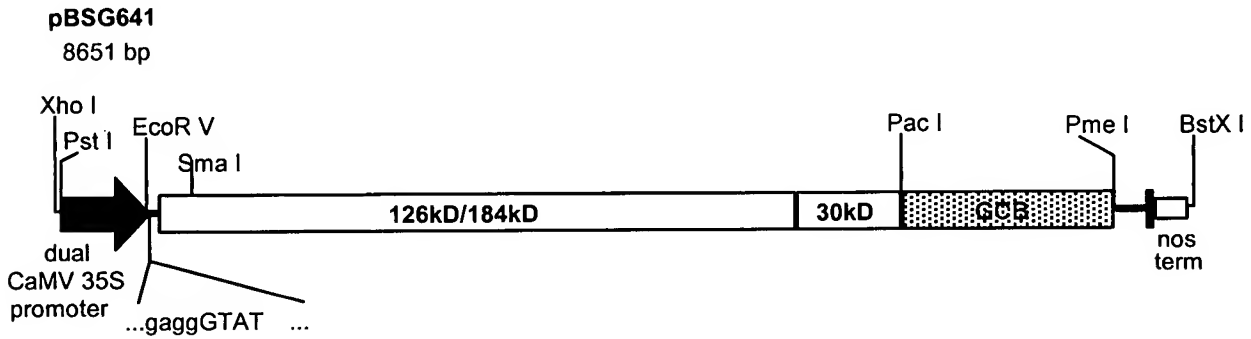

FIG. 15